Architectural Overview of IP Multimedia Subsystem -IMS

Presented by:
Masood Khosroshahy

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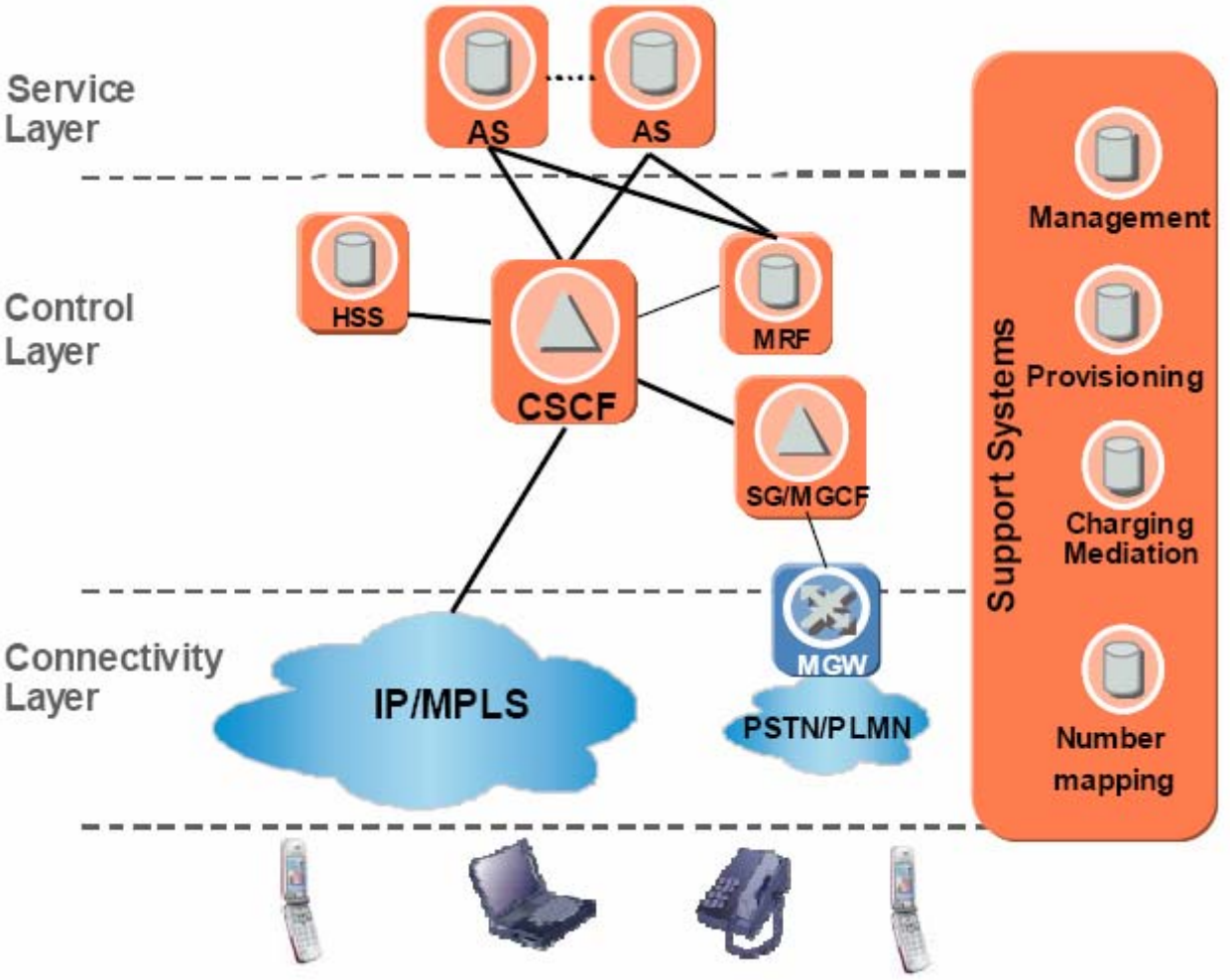
Project supervisor:
Prof. Elie Najm

BEGINNING

Simplified view of the layered architecture in IMS



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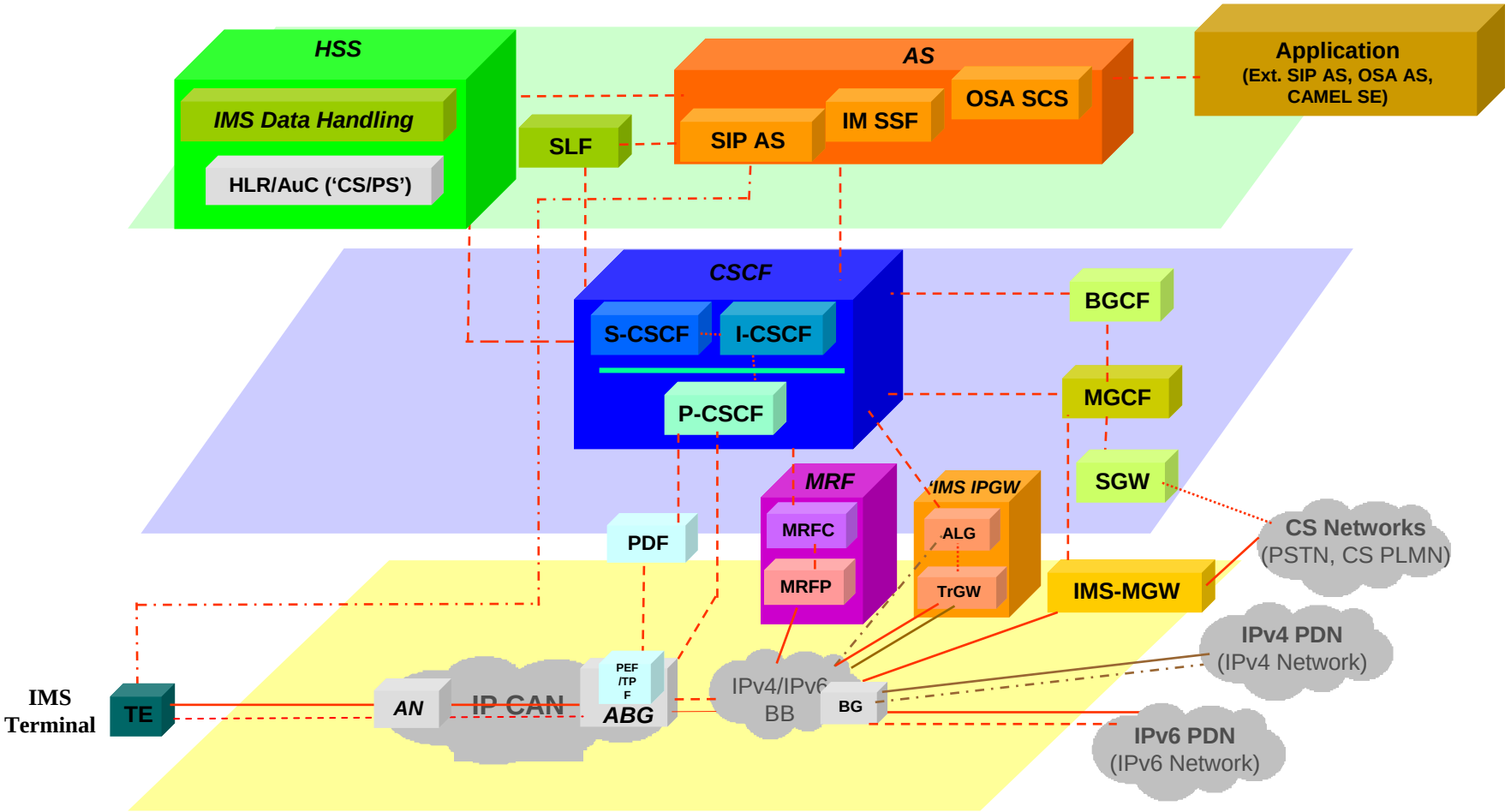
3GPP IMS Architectural Overview



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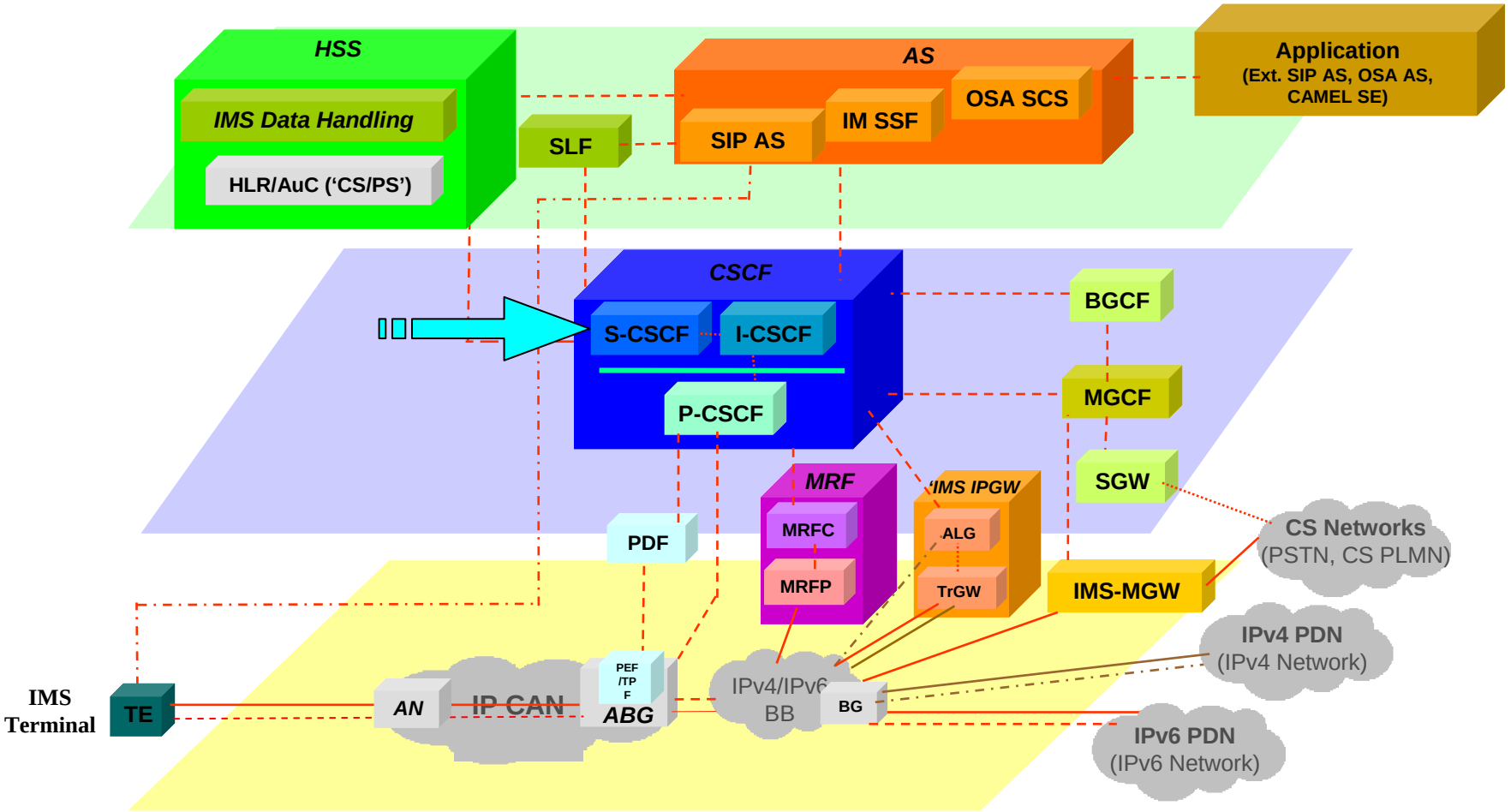
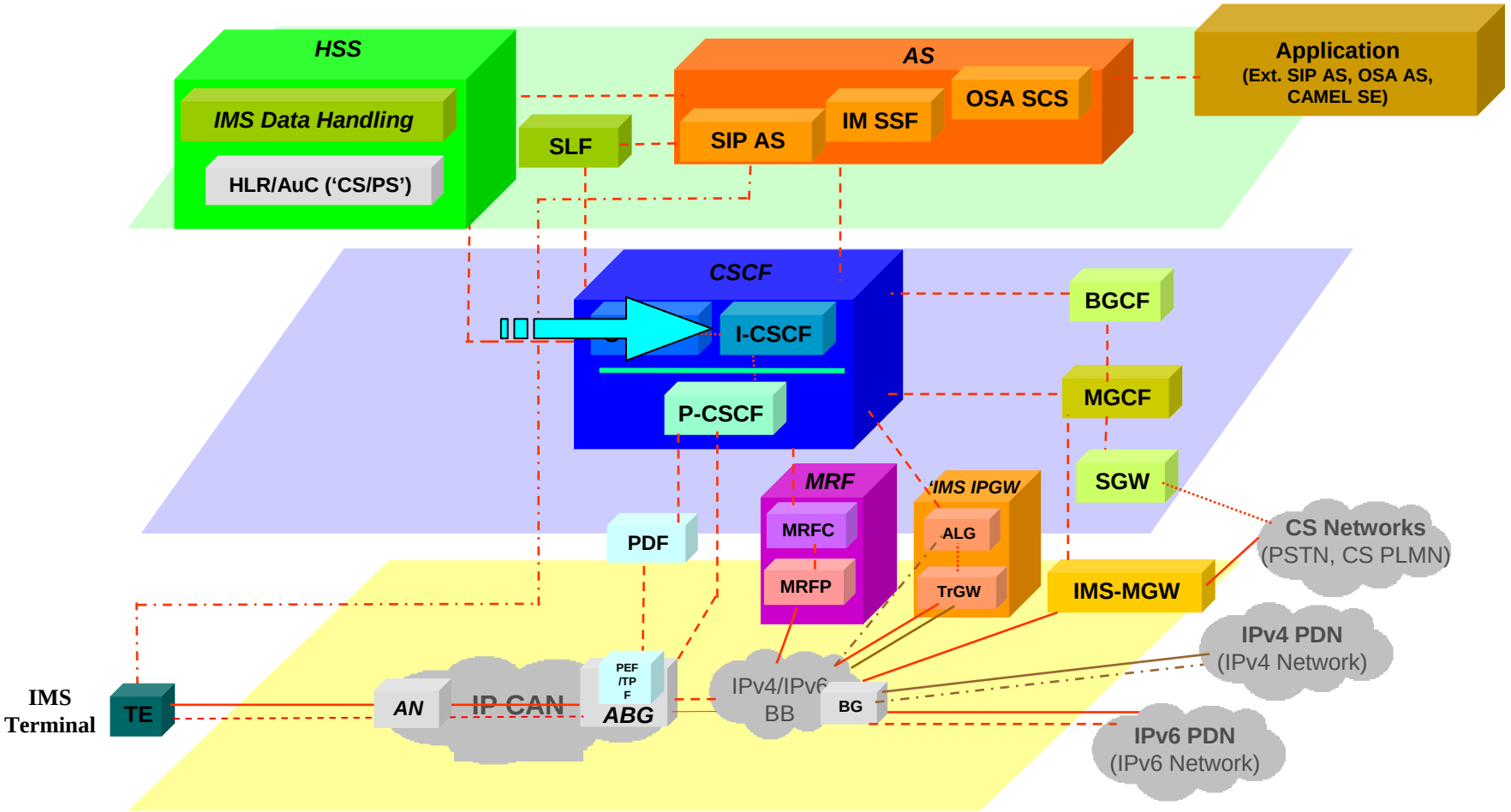
3GPP IMS Architectural Overview: Serving CSCF (S-CSCF)



Serving CSCF (S-CSCF) Functions

- Acts like a SIP Registrar, it binds the public user ID to a location.
- The S-CSCF retrieves the subscriber profile from the HSS.
- Provides session control for the endpoint's sessions (service logic is performed by an Application Server, not the S-CSCF).
- Handles SIP routing for originating and terminating endpoints.
- Ensures that the media for a session, as indicated by SDP, are within boundaries of subscriber's profile.
- Interacts with Application Server platforms for the support of services.

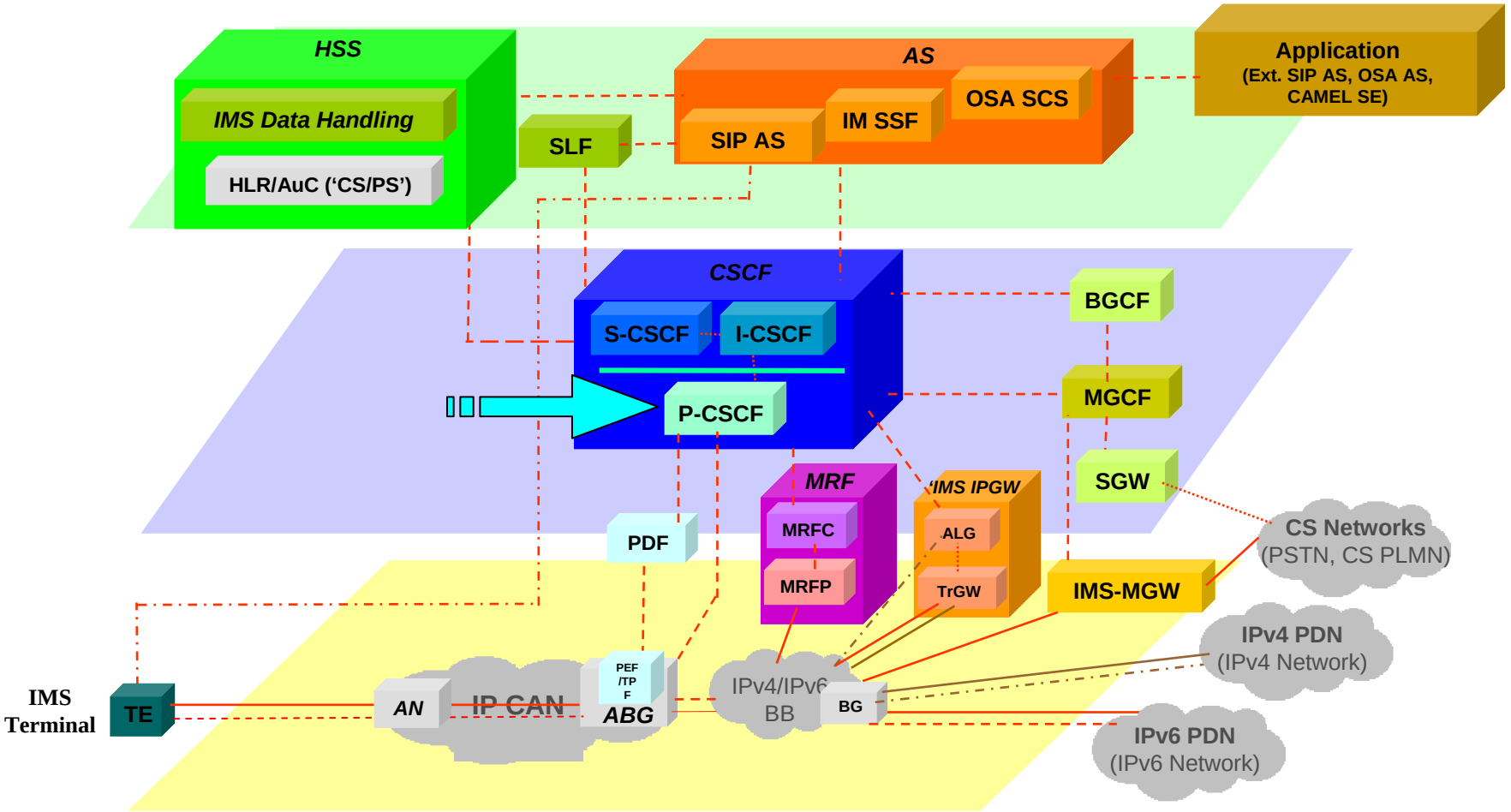
3GPP IMS Architectural Overview: Interrogating CSCF (I-CSCF)



Interrogating CSCF (I-CSCF) Functions

- Serves as the initial point of contact from other networks.
- Performs a stateless SIP proxy function.
- Selects a S-CSCF for a user during SIP registration.
- Routes SIP requests received from another network to the S-CSCF.
  - Queries the HSS for the address of the S-CSCF.
  - If no S-CSCF is currently assigned (e.g., unregistered subscriber), then assigns an S-CSCF to handle the SIP request.
- Provide Topology Hiding Interworking Gateway (THIG) function.

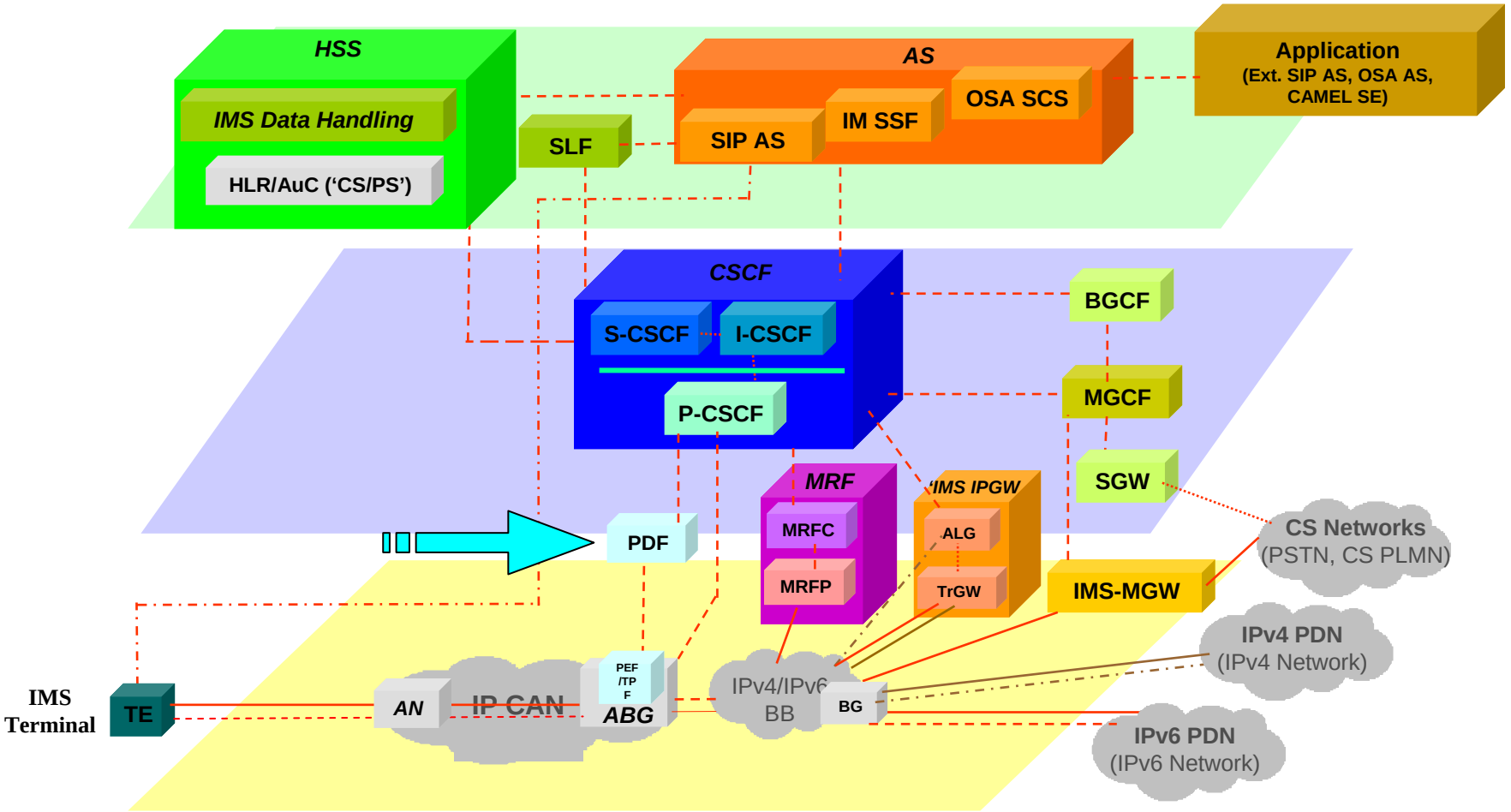
3GPP IMS Architectural Overview: Proxy CSCF (P-CSCF)



Proxy CSCF (P-CSCF) Functions

- Serves as the initial point of contact for the user terminal to network.
- Performs a stateful SIP proxy function.
- Sends the SIP REGISTER request received from the UE to an I-CSCF determined using the home domain name, as provided by the UE.
- Sends all subsequent SIP messages from the UE to the S-CSCF, whose name the P-CSCF has received as part of registration.
- Inserts a valid public user identity for UE initiated requests.
- Performs SIP message compression to reduce the amount of data sent over the radio interface.

3GPP IMS Architectural Overview: Policy Decision Function



Policy Decision Function (PDF) Functions

- Responsible for making policy decisions based on session and media-related information obtained from the P-CSCF
- Acts as policy decision point for Service-based Local Policy (SBLP) control.
- Some of policy decision point functionalities:

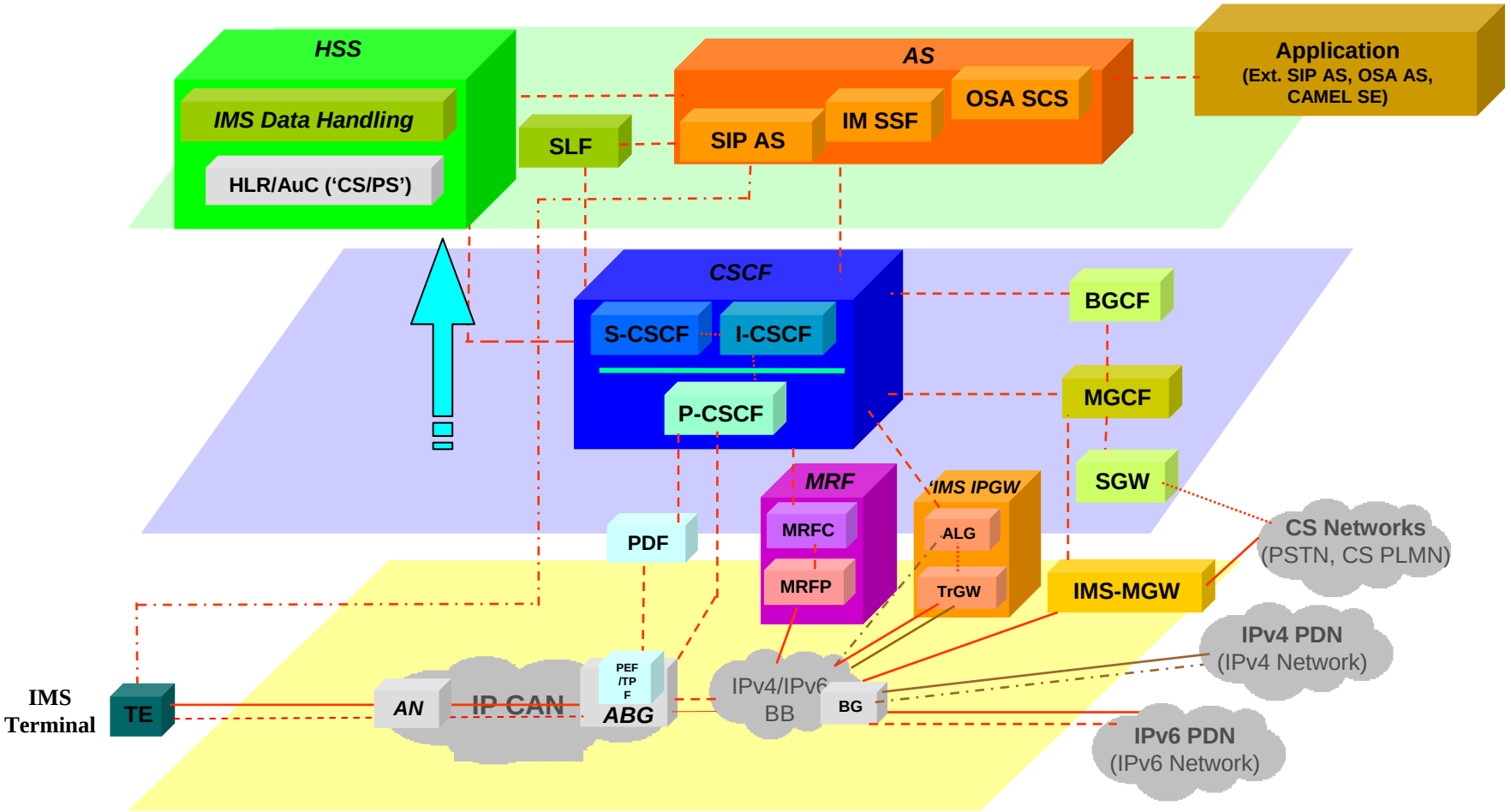
  - To store session and media-related information

  - The capability to enable the usage of an authorized bearer (e.g. PDP context)

  - To inform P-CSCF when the bearer is lost or modified.

  - To pass an IMS-charging identifier to the GGSN and to Pass a GPRS-charging identifier to the P-CSCF

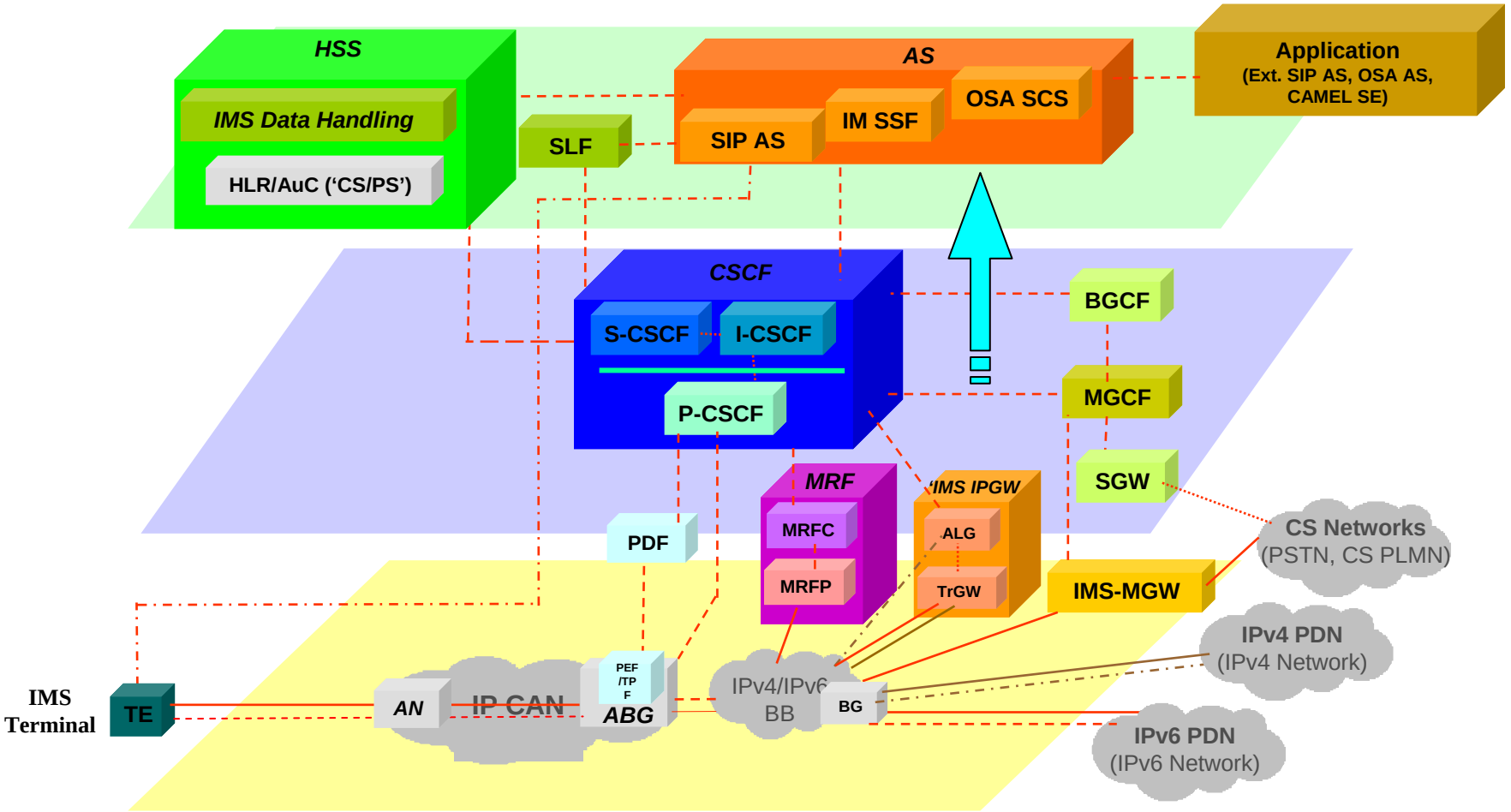
3GPP IMS Architectural Overview: Home Subscriber Server/ Subscription Locator Function



Home Subscriber Server/ Subscription Locator Function

- SLF is used as resolution mechanism to find the address of the HSS that holds the subscriber data
- The HSS supports IMS level Authentication, and Authorization.
- Holds IMS subscriber profile.
- Keeps track of currently assigned S-CSCF.
- Supports interactions with CSCFs and ASs.

3GPP IMS Architectural Overview: Application Server (AS)



Application Server (AS)

- The AS provides service control for IMS.
- May be directly connected to S-CSCF or via an OSA Gateway for 3rd party application support with security.
- Interacts with the HSS to obtain subscriber profile information.
- Supports applications such as telephony services, presence, conference control, PoC, etc.

Application Server Types

- Not pure IMS entities, rather, functions on top of IMS
- Application Servers:

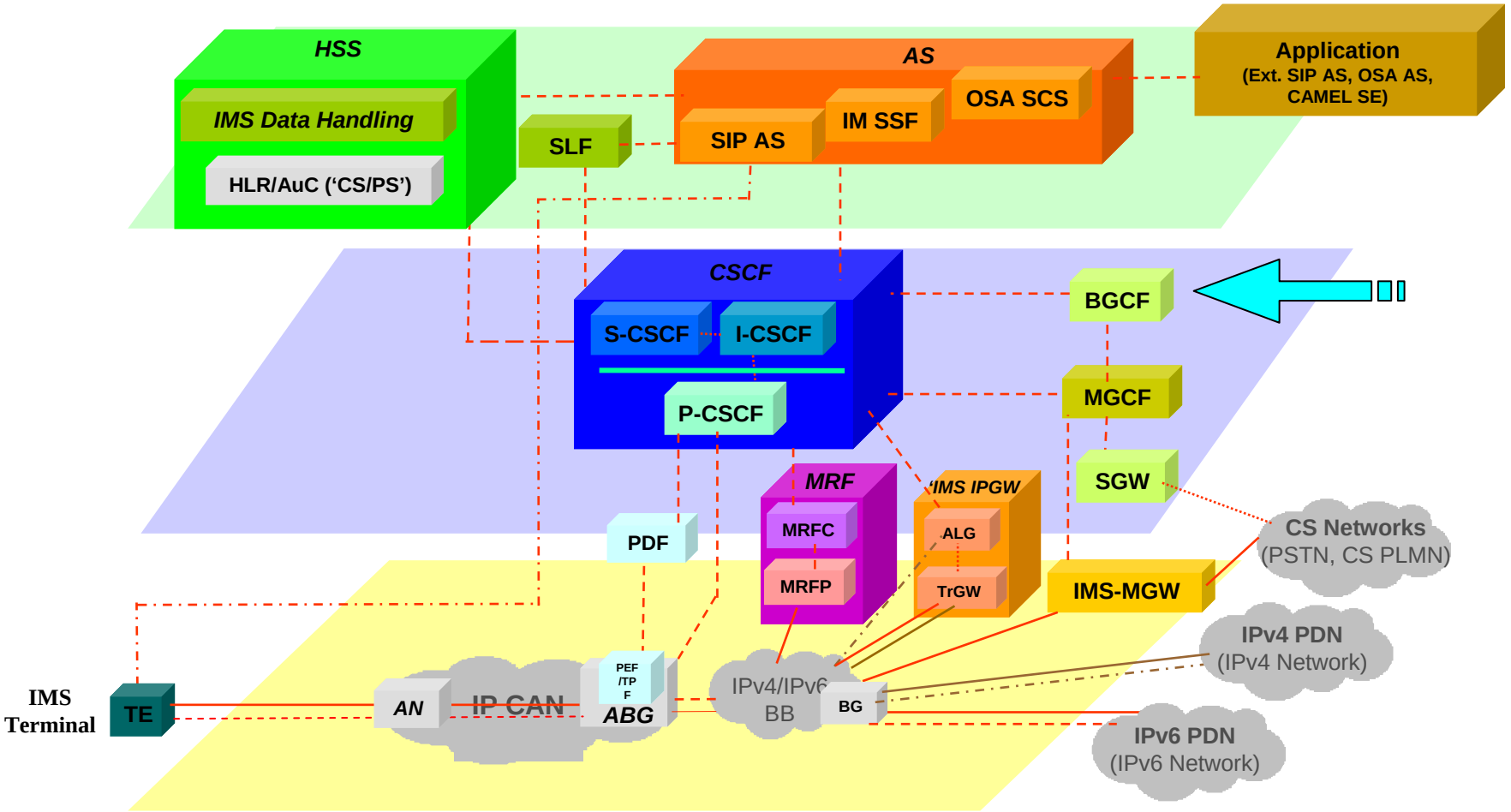
  - SIP Application Server

  - Open Service Architecture (OSA) Service Capability Server (SCS)

  - CAMEL IP Multimedia Service Switching Function (IM-SSF)

- From the perspective of the S-CSCF, all application servers exhibit the same reference point behavior

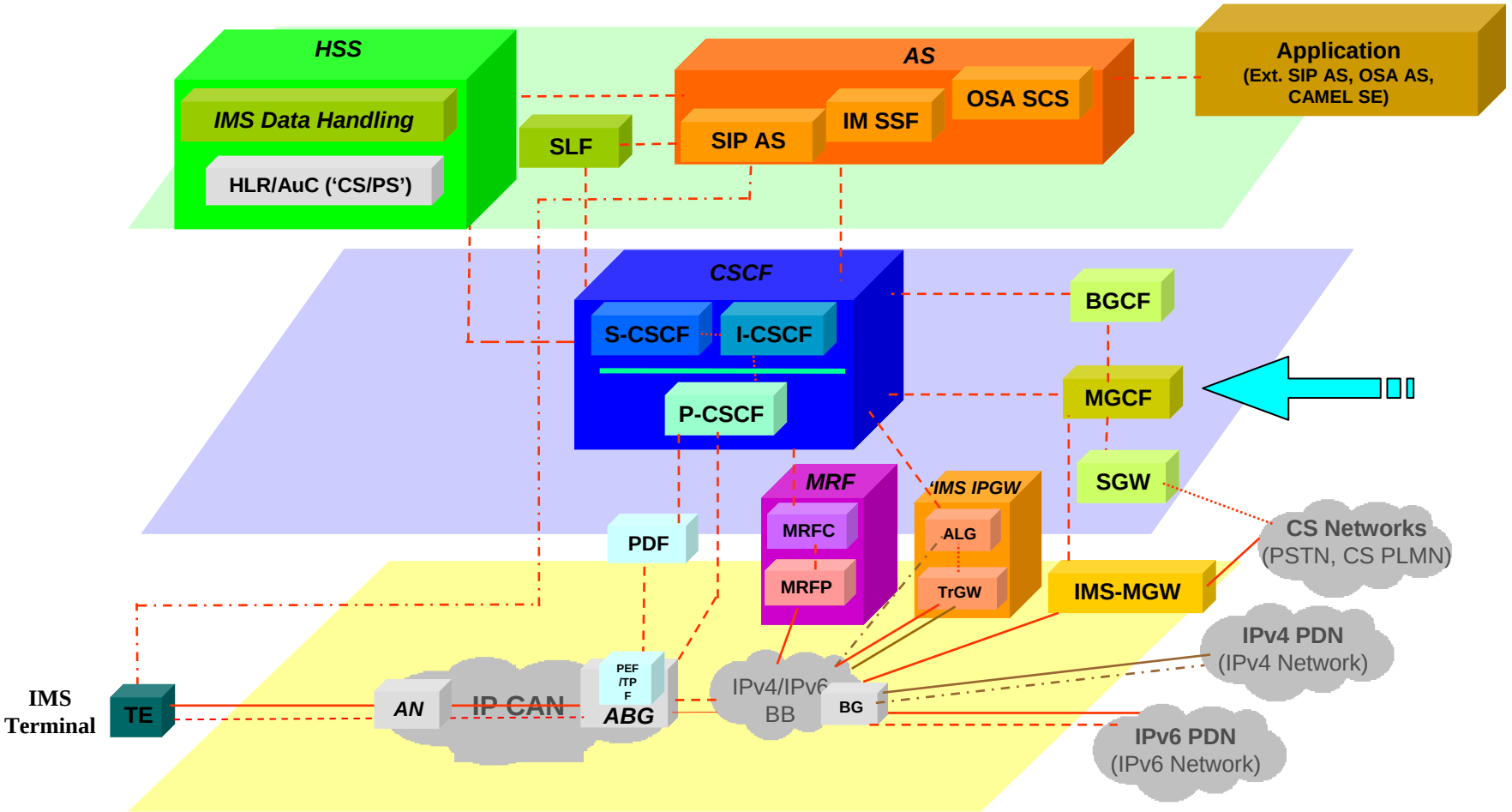
3GPP IMS Architectural Overview: Breakout Gateway Control Function (BGCF)



Breakout Gateway Control Function (BGCF) Functions

- Selects the network in which PSTN breakout is to occur.
- Selects a local MGCF or a peer BGCF.

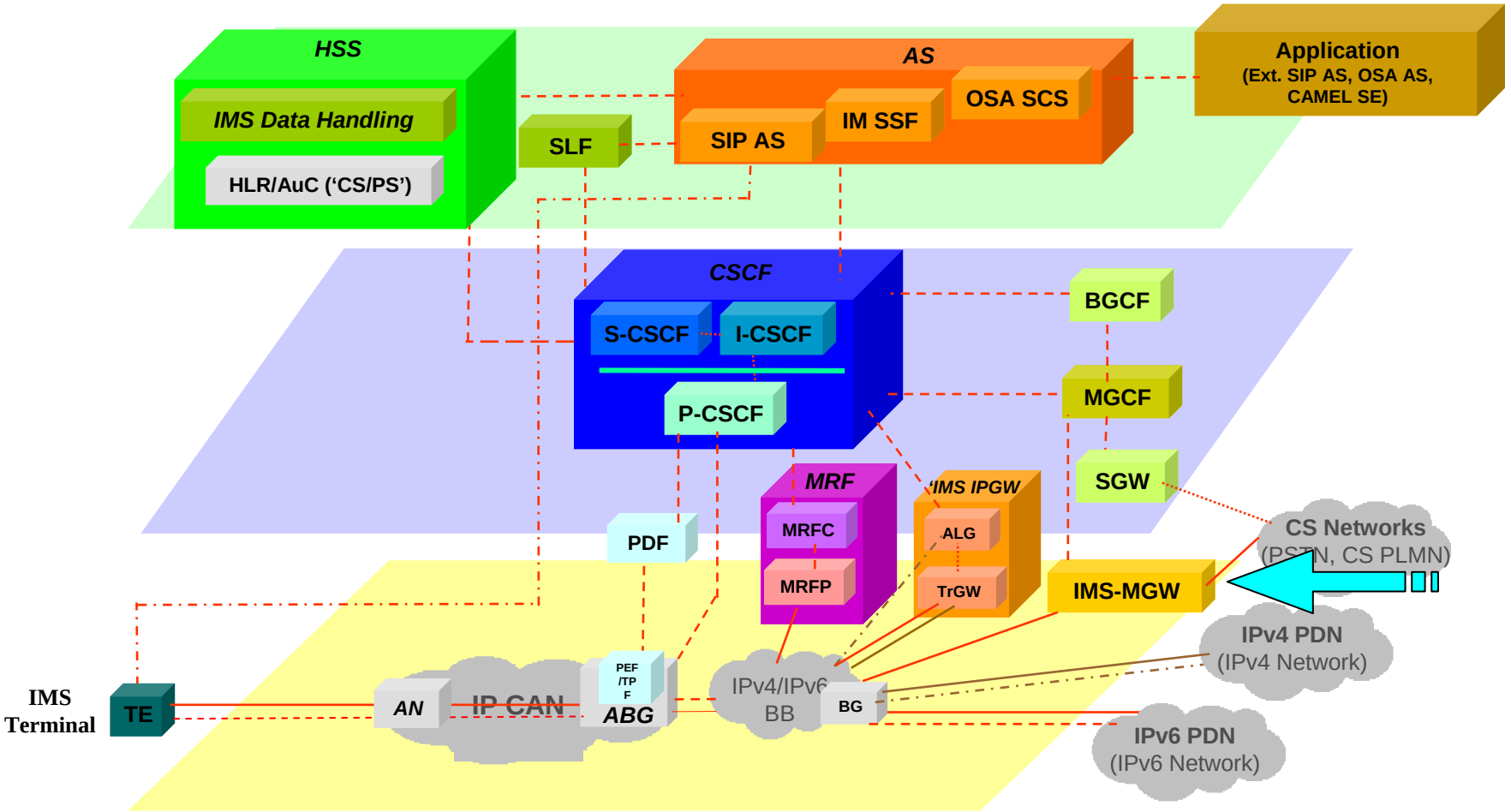
3GPP IMS Architectural Overview: Media Gateway Control Function (MGCF)



Media Gateway Control Function (MGCF)

- Controls the MGW to provide IMS connections to PSTN trunks.
- Performs protocol conversion between ISUP and SIP.
- May process out of band information such as DTMF signaling received in MGCF which it may forward to the CSCF or MGW.

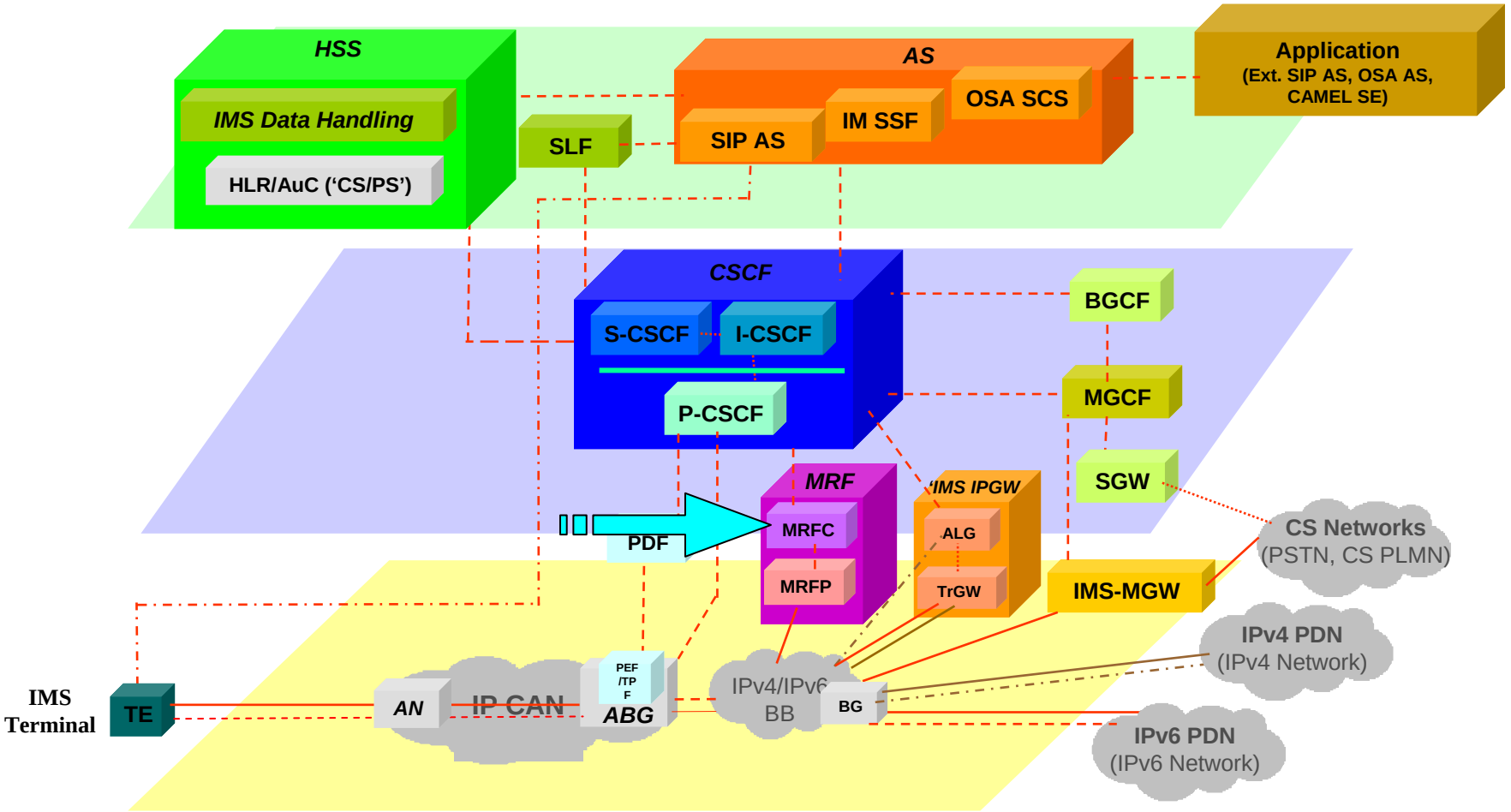
3GPP IMS Architectural Overview: Media Gateway (MGW)



Media Gateway (MGW) Functions

- Interacts with the MGCF for resource control.
- Terminates trunks from the circuit switched network and media streams from the packet network (e.g. RTP streams).
- Supports media conversion, bearer control, and payload processing
- May detect events (i.e. bearer loss, DTMF digits, etc.) and notifies the MGCF.
- May perform DiffServ Code Point (DSCP) markings on the IP packets sent towards the UE.

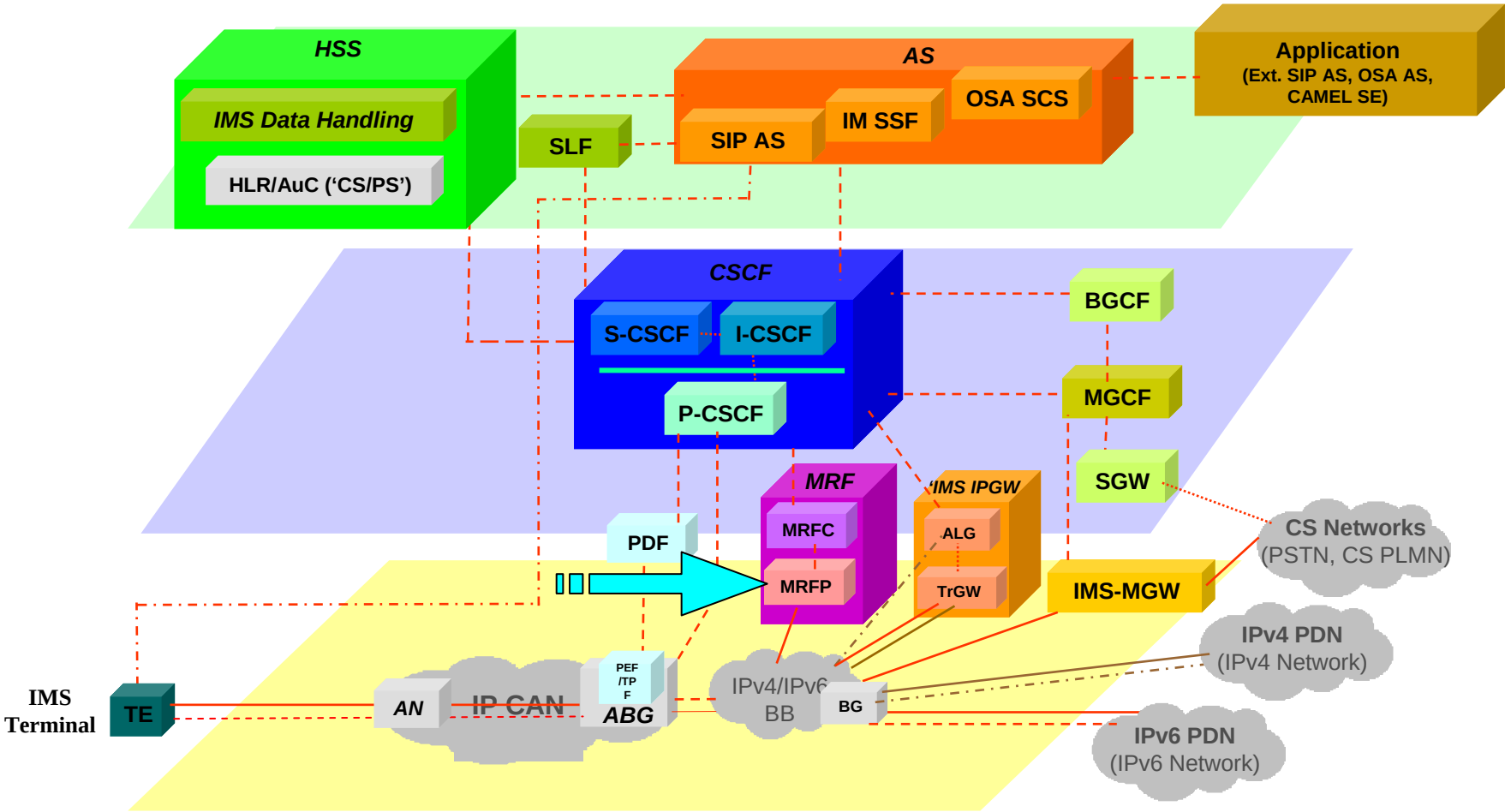
3GPP IMS Architectural Overview: Media Resource Function Controller (MRFC)



Media Resource Function Controller (MRFC) Functions

- Controls the media stream resources in the MRFP.
- Interprets information from an AS via the S-CSCF (using SIP) and controls the MRFP accordingly.
- May be co-located with an AS to provide capabilities such as conference services.

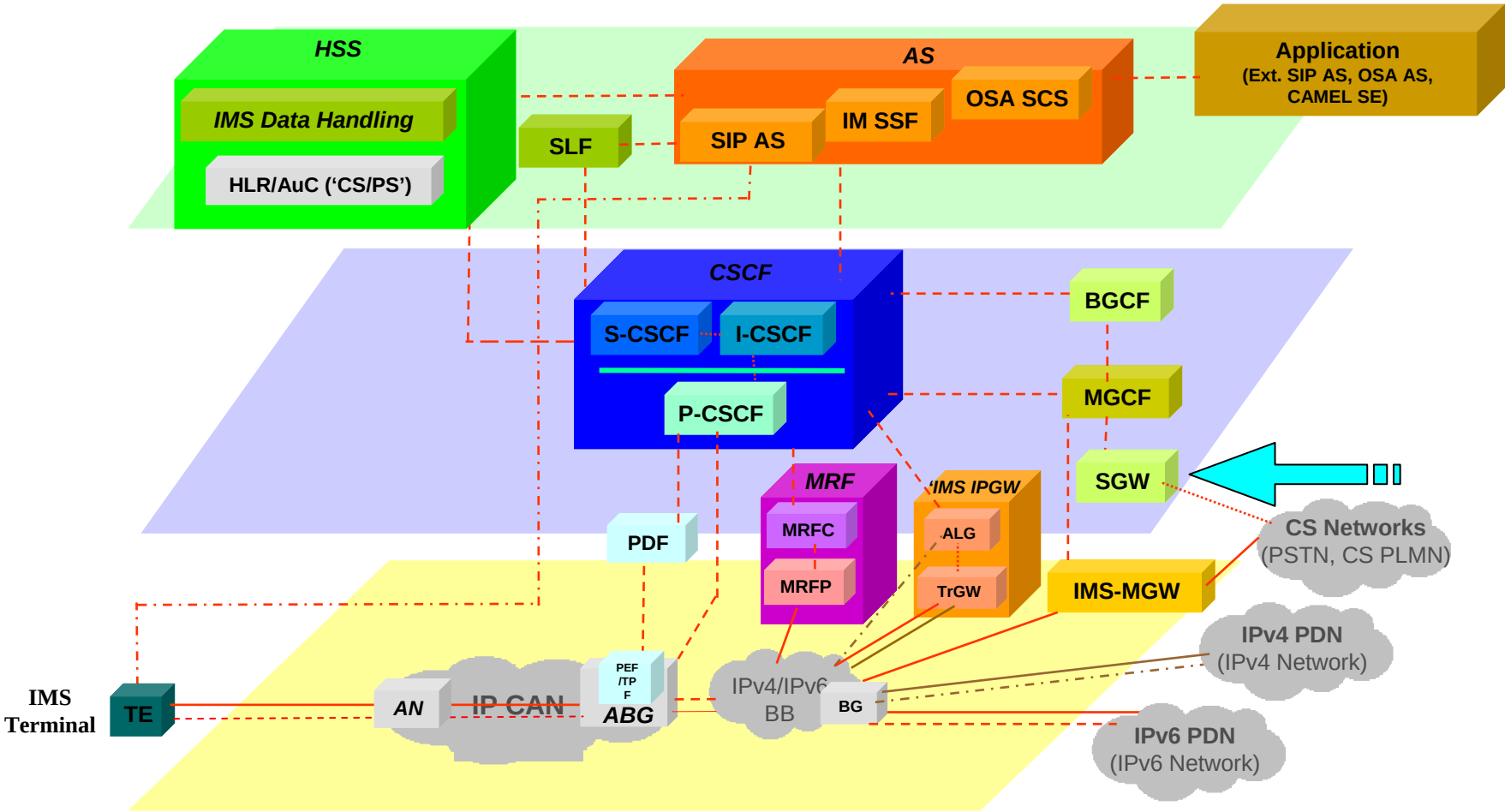
3GPP IMS Architectural Overview: Media Resource Function Processor (MRFP)



Media Resource Function Processor (MRFP) Functions

- Under the control of MRFC
- Mixes incoming media streams (e.g. for multiple parties).
- Sources media streams (for multimedia announcements).
- Processes media streams (e.g. audio transcoding).
- Provide tones and supports DTMF within the bearer path.
- Notifies the MRFC when an event has occurred such as DTMF digit collection.

3GPP IMS Architectural Overview: Signaling Gateway



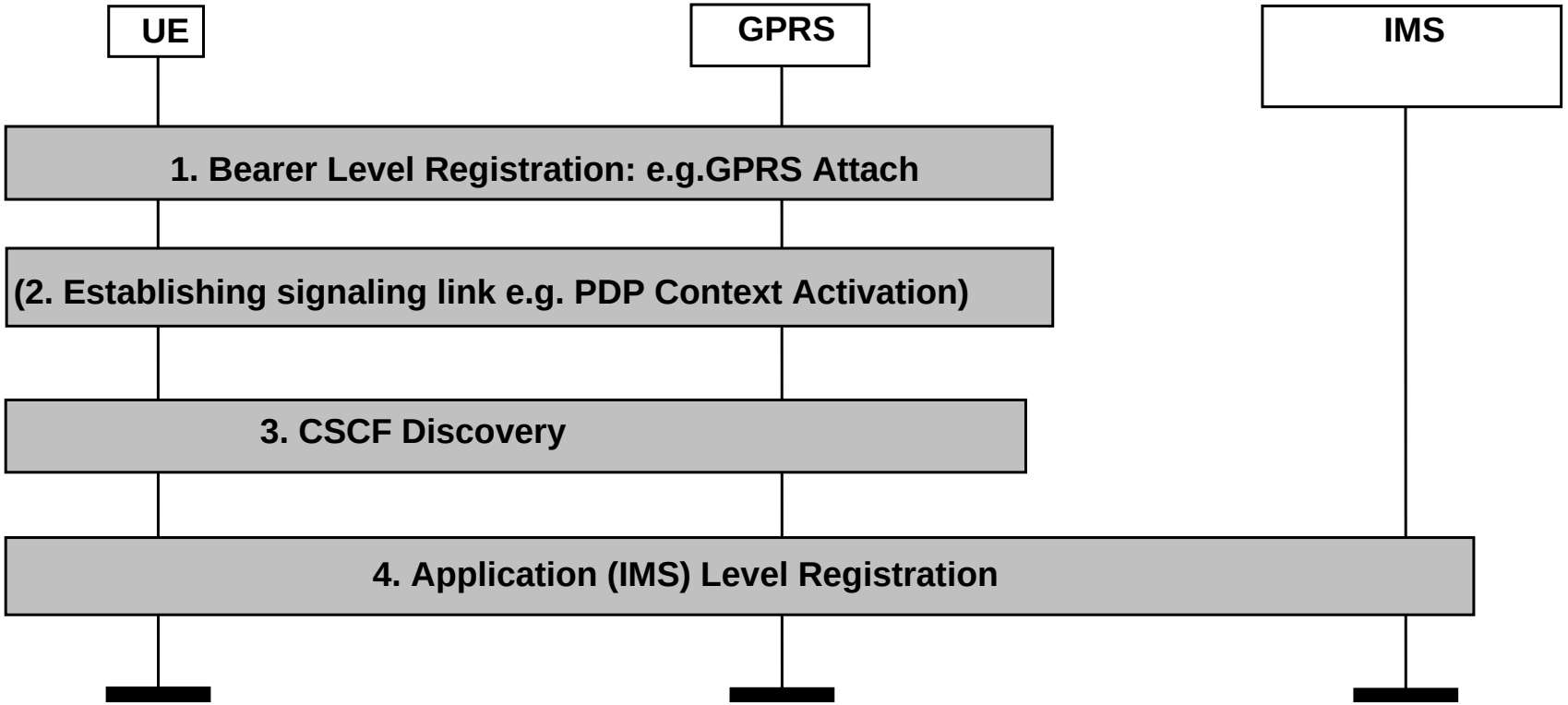
Signaling Gateway

- Used to interconnect different signaling networks, such as SCTP-IP-based signaling networks and SS7 signaling networks.
- Performs signaling conversion at the transport level.
- Does not interpret application layer messages.

Two Procedures

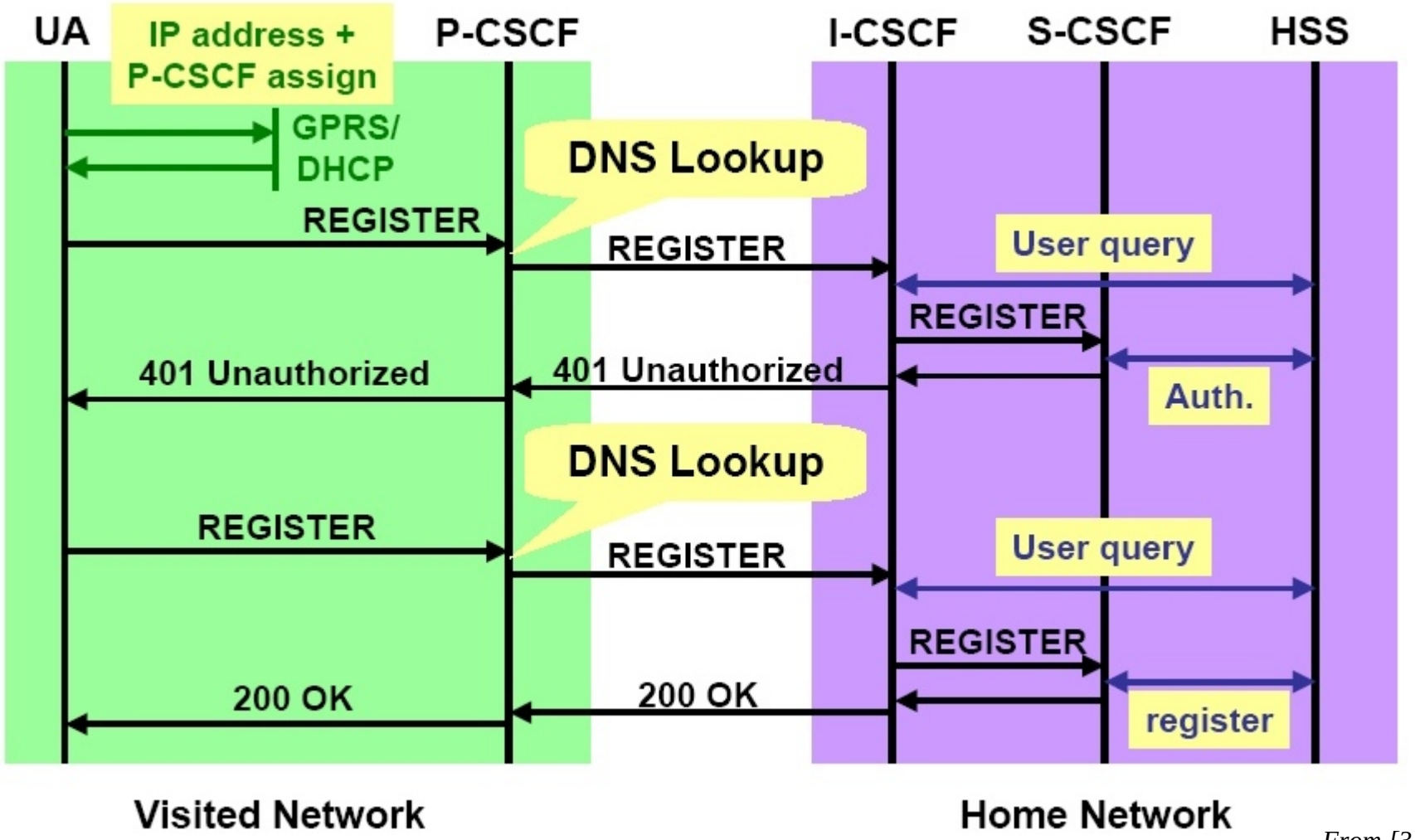
- Registration
- Simple Call

2-phase registration



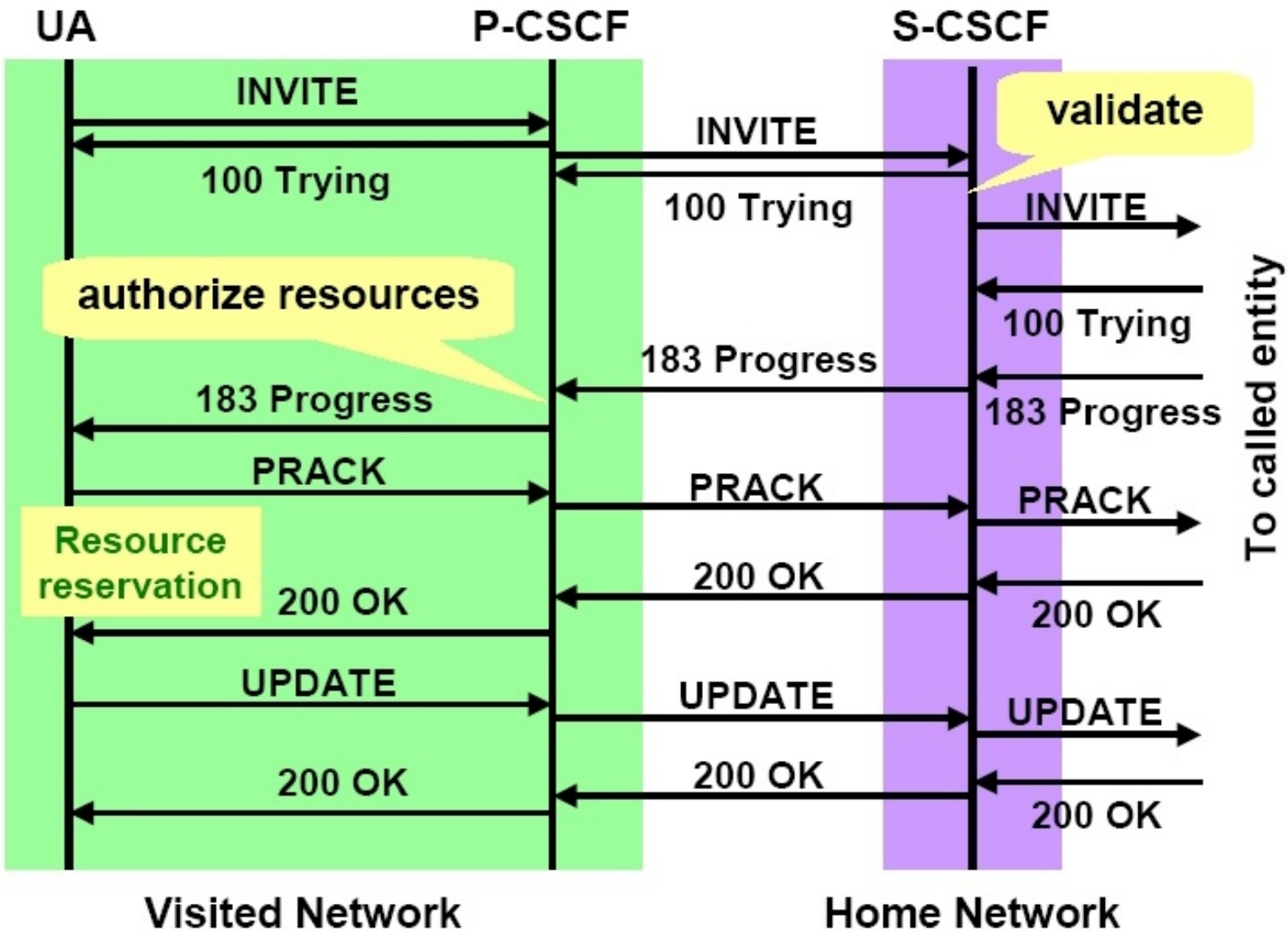
From [2]

SIP Registration of a Mobile Node



From [3]

Simple SIP Call: Caller Side (1)



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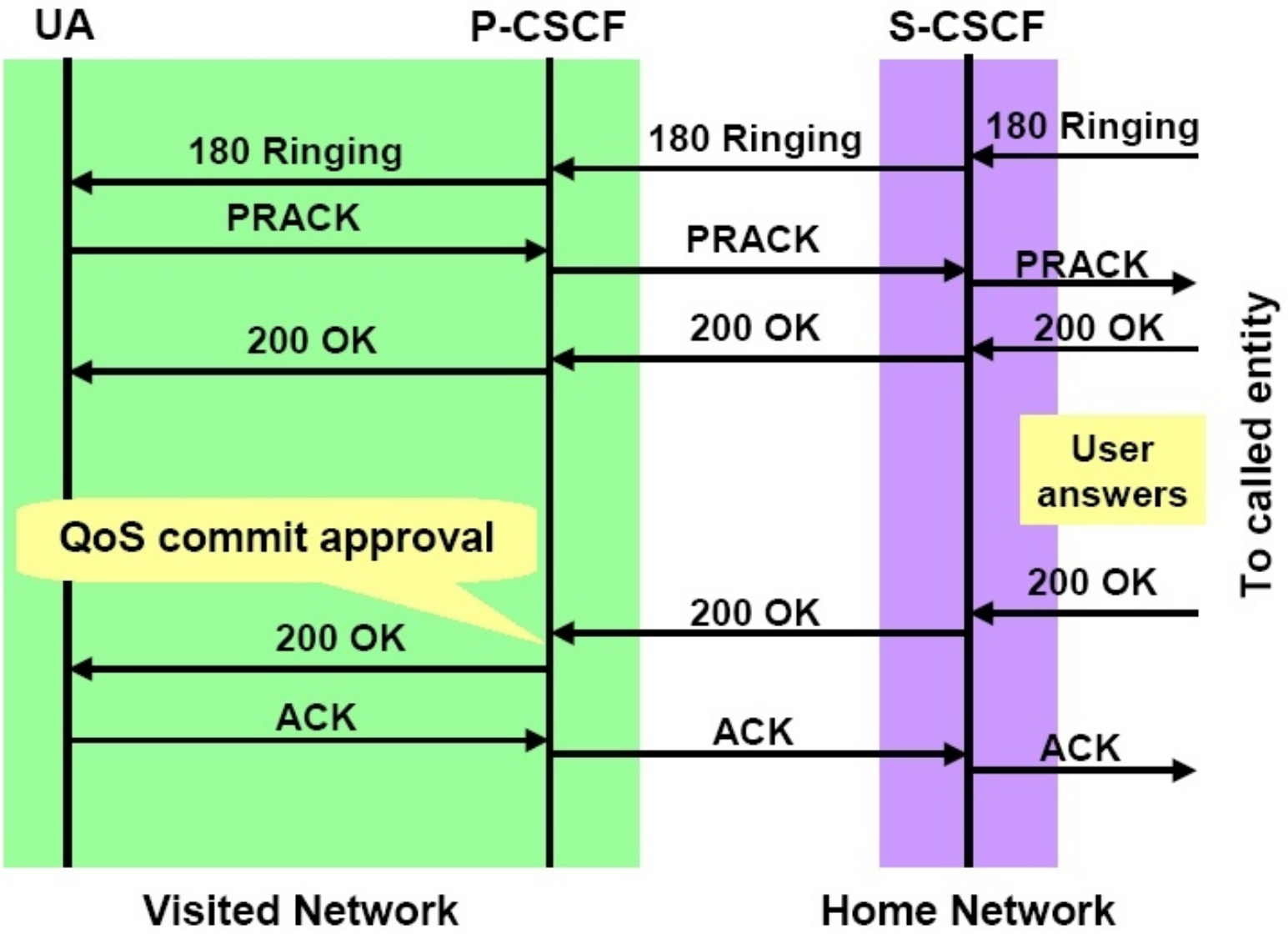
Simple SIP Call: Caller Side (2)



From [3]

References

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Thank you for your attention …

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